

The background of the cover is a deep blue space scene. On the right side, the curved horizon of the Earth is visible, showing a thin layer of white clouds. The rest of the background is filled with numerous small, bright stars of varying colors (white, blue, yellow).

NOTES FROM VSA MATH

How to Analyze Stocks

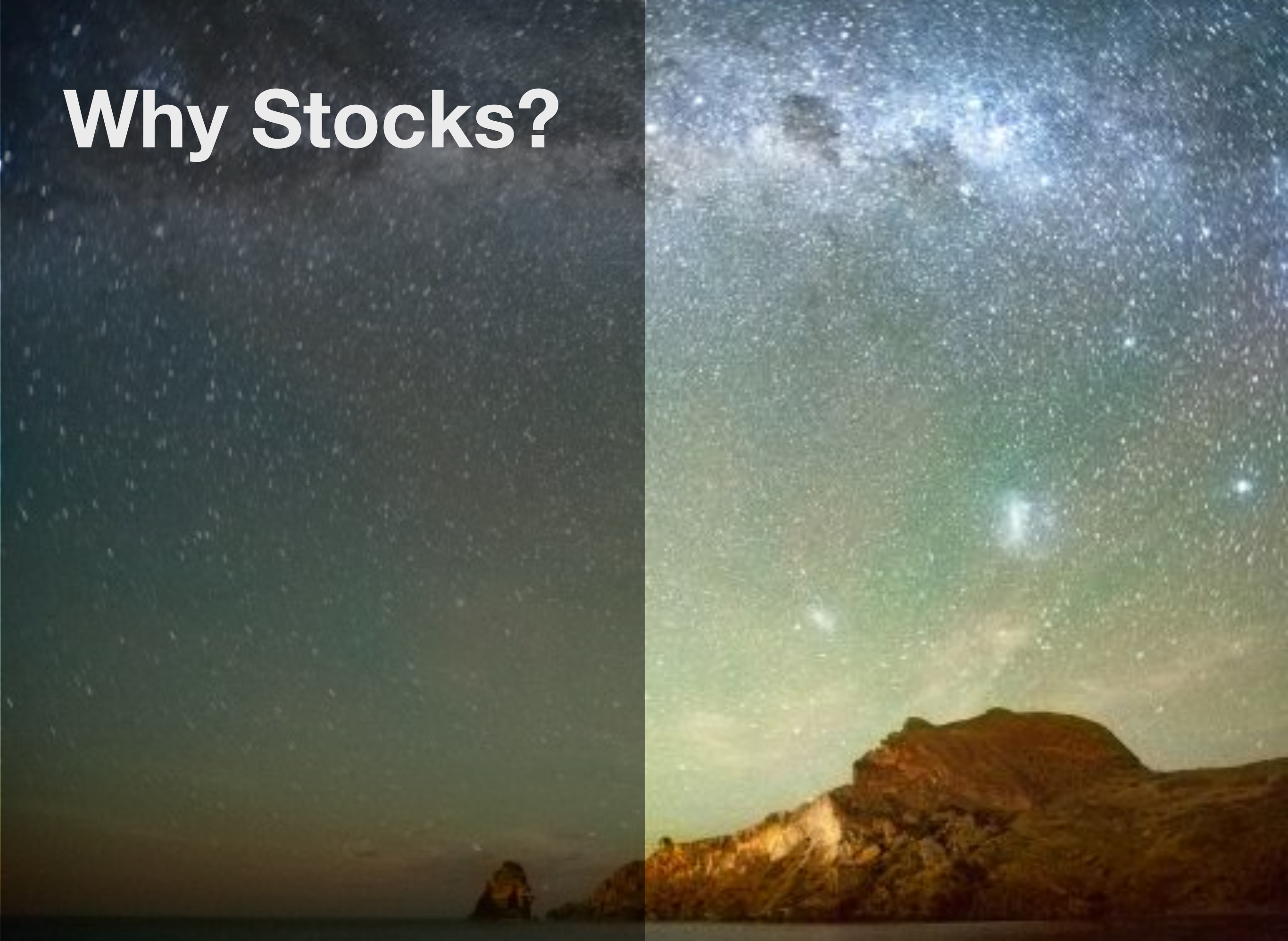
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Why Stocks?



In this unit, we are covering how things grow. We could look at anything: bacteria growing and making you sick, the population of the world growing (it recently hit 7 billion), the decay of radioactive particles, or the number of cars on the road as car factories produce them each day.

I chose stocks for you for this unit. Why? I feel that in addition to a mathematical education, each of you needs a financial education as well. By 10th grade, many of you have some pocket money--whether you get an allowance, do chores to earn it, or get it from your parents when you ask. You also get red pocket money each year.

In addition, you are going to college in just a few years time and will have to manage your own financial affairs then or very soon thereafter. By teaching you about stocks, I hope that you will learn the value of savings, and that you will take this lesson with you into the future and become rich.

You read or are reading The Unfair Advantage by Robert Kiyosaki over the holidays (Term Break, Christmas, and Chinese New Year). You may be wondering why I give you a book to read about real estate, and yet teach you about stocks in the classroom. I do this very much on purpose. There are other books I could have given you on stocks--David Bach has a whole series including The Automatic Millionaire--but I feel there are three places to put your money (savings (cash in your wallet, Octopus Card, savings account, current account, time deposits,

foreign currencies, money markets, gold, investment grade bonds), stocks (common, preferred, junk bonds), and real estate (apartments, shopping centers, houses, time shares, car parks, storage facilities, REITs)) and I wanted you to be exposed to all three during this course.

Dedication

This book is dedicated to my year 10 class of 2012-13. I hope you use the information contained herein to make yourselves financially independent so that you can do what you want with your lives. Alfred, Anson, Brian, Cole, Hingis, Ian, Isaac, both Jasons, Josephine, Kelly, Kelvin, Linus, Marvin, Mathew, Matthias, Nathan, Nettie, Ryan, Sabrina, and Stephanie: You are the reason I have written this book. I hope you take the lessons here and use them to build your lives on a solid financial foundation.

It is also dedicated to my father, who taught me everything I know about investing in stocks, and to my wife, who tried to teach me about investing in real estate.

Disclaimer

“Past Performance is No Guarantee of Future Results.”

-Standard Disclaimer

Investing in stocks is not like putting money in a bank where the government guarantees you will get your money back. To earn money in stocks, you must find companies that are growing and earning more and more money each year which they either give you directly in the form of a dividend check or which they reinvest to grow the business even more. Should they fail to grow as you have predicted, your investment may not increase in value. Should the company go bankrupt, your common stock will become worthless (most likely worth \$0 per share). Even if you pick a very good company, if you pay too high a price, even a growing company can go down in market price if not in book value. Even if you pick a good company at a good price, a market crash can bring the price even lower.

I mention various stocks in the course of explaining the concepts in this book. The information I share is always from my research on the stock and may no longer be current by the time you read this. I own or have owned many if not all of the companies I mention throughout the class. I reserve the right to buy more or sell them as I see fit. Just because I bought a company in the past, doesn't mean it's a good deal now.

Most important: do your own research, and make your own decisions.

Choosing Our Stocks

Today we went to the library and to check out annual reports. Each student chose one annual report to study in the coming month. Once the student had chosen their annual report, they sat down to read the letter from the CEO of the company.



Everybody Can Be Rich

Being rich isn't a mystery. It's not something that only happens to a lucky few or a chosen elite. Being rich is a choice that you make when you are young. Everybody can be rich: it just takes time, patience, and practice.



The Mathematics of Being Rich

FUN FACTS

1. **Cost of a Trip to Mars: US\$20,000,000,000.**
(Zubrin, The Case for Mars, 1996)
2. **Oldest Woman: Jeanne Calment**
(1875-1997) 122 years 164 days old
(Wikipedia, 2012)
3. **Oldest Man: Christian Mortensen**
(1882-1998) 115 years 252 days old
(Wikipedia, 2012)
4. **Oldest Living Woman: Besse Cooper (1896-present)** 116 years old (Wikipedia, 2012)
5. **Oldest Living Man: Jiroemon Kimura (1897-present)** 115 years old (Wikipedia, 2012)
6. **Unverified Claims of living to 128 years old:**
3--2 men and 1 woman (Wikipedia, 2012)
7. **Achievable Target Return in Stocks: 15%**
(NAIC, www.betterinvesting.com, 1987)
8. **Return in Stocks, Best in Business:**
20-25% (Warren Buffet's forward to Benjamin Graham's The Intelligent Investor, 2003)

It's not hard to be rich. Anyone can do it.

Perhaps I should define what I mean by being rich first. I'm not talking about being the richest person in the world--only 1 in 7 billion can be that. I'm not even talking about being the richest person in Hong Kong--only 1 in 7 million can be that. I am talking about having enough money to do what you want in life. I am talking about having enough money that you can choose to work or not as you wish, not as finances dictate. Let's say, for example, that you want to go to Mars for a vacation. This is something only a very rich person could even think about doing. The price tag, as of 1996, was 20 billion US dollars. This includes research & development and would take 10 years from the time you put up the money until the rocket ship was ready for launch. If you have enough money to go to Mars, then you are rich in my book. Feel free to substitute any other definition for being rich--provided that definition includes a specific dollar amount and does not involve becoming richer than someone else who also wants to be richer than you.

Let's start with \$1,000 HKD in red pocket money when you are 15 years old and see what happens if we invest that at 15%/year--an amount achievable in stocks, but not guaranteed (remember Lehman Brothers!).

Growth of \$1,000 HKD Over a Lifetime

Age	Money in HKD	in USD
15	HK\$1,000	HK\$128.21
20	HK\$2,000	HK\$256.41
25	HK\$4,000	HK\$512.82
30	HK\$8,000	HK\$1,025.64
35	HK\$16,000	HK\$2,051.28
40	HK\$32,000	HK\$4,102.56
45	HK\$64,000	HK\$8,205.13
50	HK\$128,000	HK\$16,410.26
55	HK\$256,000	HK\$32,820.51
60	HK\$512,000	HK\$65,641.03
65	HK\$1,024,000	HK\$131,282.05
70	HK\$2,048,000	HK\$262,564.10
75	HK\$4,096,000	HK\$525,128.21
80	HK\$8,192,000	HK\$1,050,256.41
85	HK\$16,384,000	HK\$2,100,512.82
90	HK\$32,768,000	HK\$4,201,025.64
95	HK\$65,536,000	HK\$8,402,051.28
100	HK\$131,072,000	HK\$16,804,102.56
105	HK\$262,144,000	HK\$33,608,205.13
110	HK\$524,288,000	HK\$67,216,410.26
115	HK\$1,048,576,000	HK\$134,432,820.51
120	HK\$2,097,152,000	HK\$268,865,641.03
125	HK\$4,194,304,000	HK\$537,731,282.05

Table 2.1: This is a table showing how to become rich starting with just your red pocket money this Chinese New Year.

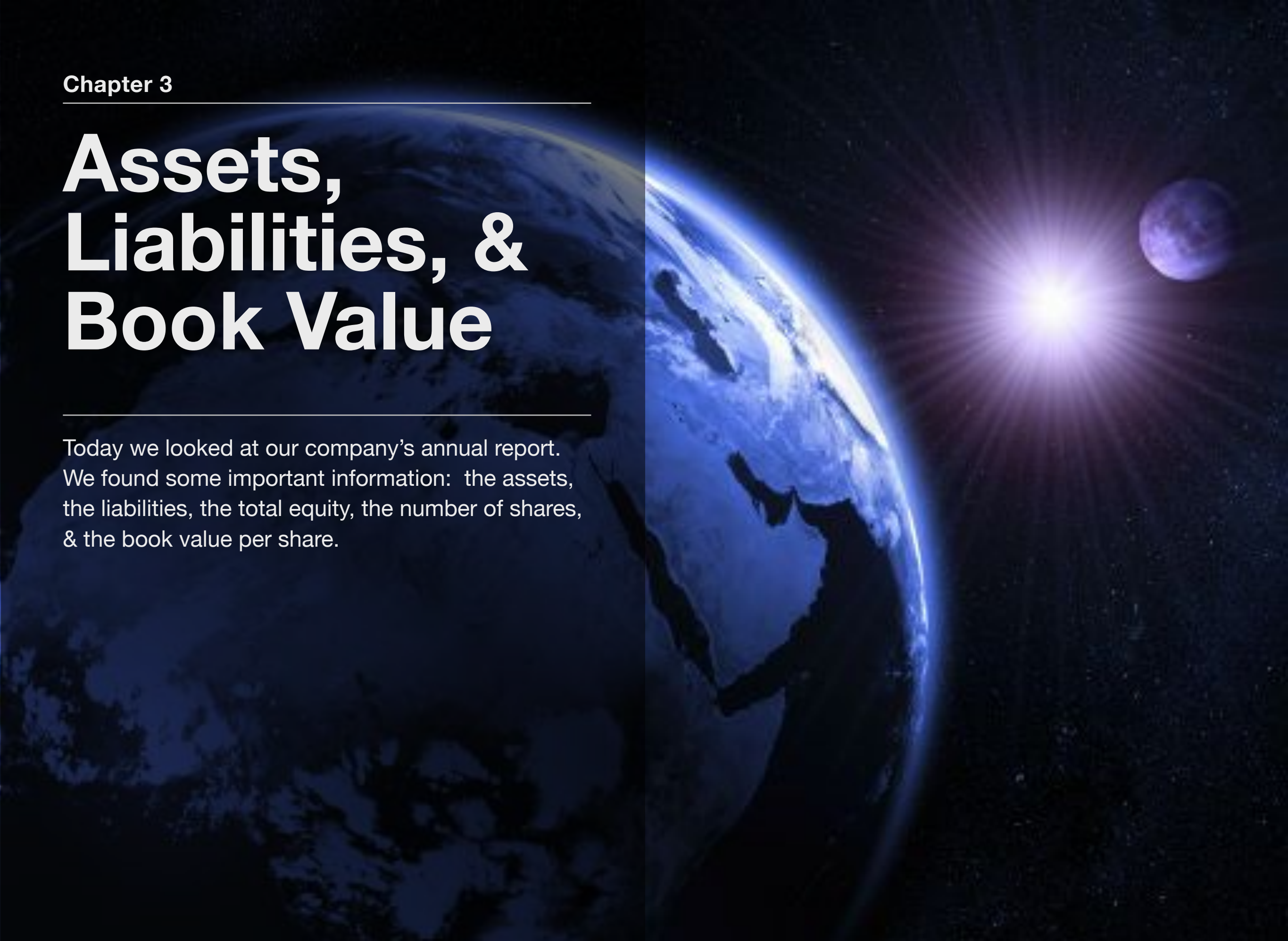
OK. So we didn't quite make it, but with \$1,000 HKD, we wound up with over half a billion USD within a human lifetime (this

does assume you live to be quite old--but once again, achievable old). If you want to go to Mars, you would need \$40,000 HKD today, at age 15, to be able to afford it by the time you reach 125 years old. If that sounds like too much money to get this year, perhaps it would be easier to gather \$80,000 by the time you are 20 (in college).

There are smaller targets you want to be thinking about earlier. Markets crash, so you don't want to invest in stocks if you need the money in the next 5 years or so (you want to be able to hold your stocks through the next financial tsunami). Do you want to buy an apartment in Hong Kong? How much will you have to put as a down payment? How much should you save today so it can grow to that amount by the time you need it? Use a chart like the one at the left to figure it out.

Assets, Liabilities, & Book Value

Today we looked at our company's annual report. We found some important information: the assets, the liabilities, the total equity, the number of shares, & the book value per share.



Information for my Company

BASIC FACTS

- 1. Company Name: Stryker
- 2. Stock Symbol: SYK
- 3. Total Assets: \$12,405,000,000 USD
- 4. Total Liabilities: \$4,722,000,000 USD
- 5. Total Equity: \$7,683,000,000 USD
- 6. Total Shares: 389,500,000
- 7. Book Value: \$19.73 USD

I can calculate many important numbers easily in iBooks by using the tables. This is a quick and easy way to do my calculations and, more importantly, the calculations will update themselves if I ever change the original data.

Calculating my Book Value	
	2011 Data
Equity	\$7,683,000,000
Shares	389,500,000
Book Value/Share	\$19.73

Table 2.1: I am using this table to calculate the book value of my company. The data comes from the Stryker 2011 form 10-K in item 6. You can find information on many US companies using the form 10-K from www.sec.gov. For HK companies, the same information can be found in the annual report posted on their websites. I am using the diluted number of shares.

We can use this number very roughly to see how cheap or expensive my stock is today. Perhaps I want to buy some more. Perhaps I want to sell some. Let's see.

It's current price is \$52.71 USD. That sounds quite expensive.

Predicting the Future

We don't really care how much the company was worth back in 2007, but what we do care about is how much it will be worth in, say, 2020. In other words, if I buy this company today at its current price, will I make money or lose money?



Predicting the Future

So I’m trying to figure out how much my company will grow in the future. One way to figure that out is to consider how much it has grown in the past. Let’s plug in some data and see what we see.

than 9% and sometimes much worse. I doubt the future will look exactly like this, but I hope it might be close.

That \$52.71 current price doesn’t seem quite so high anymore, but it still looks a little expensive.

Stryker’s Book Value Growth 2007-2011

Year	2007	2008	2009	2010	2011
Equity	HK\$5,379,000,000	HK\$5,407,000,000	HK\$6,595,000,000	HK\$7,174,000,000	HK\$7,683,000,000
Shares	417,200,000	413,600,000	399,400,000	399,500,000	389,500,000
Book Value/Share	\$12.89	\$13.07	\$16.51	\$17.96	\$19.73
Percent Increase		1.4%	26.3%	8.8%	9.8%

Figure 3.1: This is how much Stryker has grown over the past 5 years. I wonder what will happen if it keeps growing that fast.

We can find out what happens if Stryker keeps growing that fast quite easily by extrapolating the trend.

Stryker’s Possible Book Value 2012-2020

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020
NAV	HK\$21.5	HK\$23.4	HK\$25.5	HK\$27.8	HK\$30.3	HK\$33.0	HK\$36.0	HK\$39.3	HK\$42.8

Figure 3.2: This is what I predict Stryker will do based on a growth rate of 9% per year. Please note the historical trend is sometimes much better

Interest Rates & HK Banking

In Hong Kong, as a young person, you have many investment options available to you. You can save money in the bank at various interest rates in various currencies and for various amounts of time (time deposits). You can buy a lot of stocks (I don't mean many, I mean one round lot) with your red pocket money. The only type of investing you probably can't do is real estate: apartments in Hong Kong are too expensive for most 15 year olds.



Common Differences & Ratios

There are two basic mathematical techniques to predict the future. One is known as an arithmetic sequence which has a common difference and can be modeled with a linear equation. The other is a geometric sequence which has a common ratio and can be modeled by an exponential equation. You will quickly realize we prefer stocks with geometric characteristics.



Calculating Common Differences & Ratios

Today we looked at some Mathletics while some students were finishing collecting their data (6 years of book values). Once we all had all our data, we worked on calculating both the common difference and the common ratio.

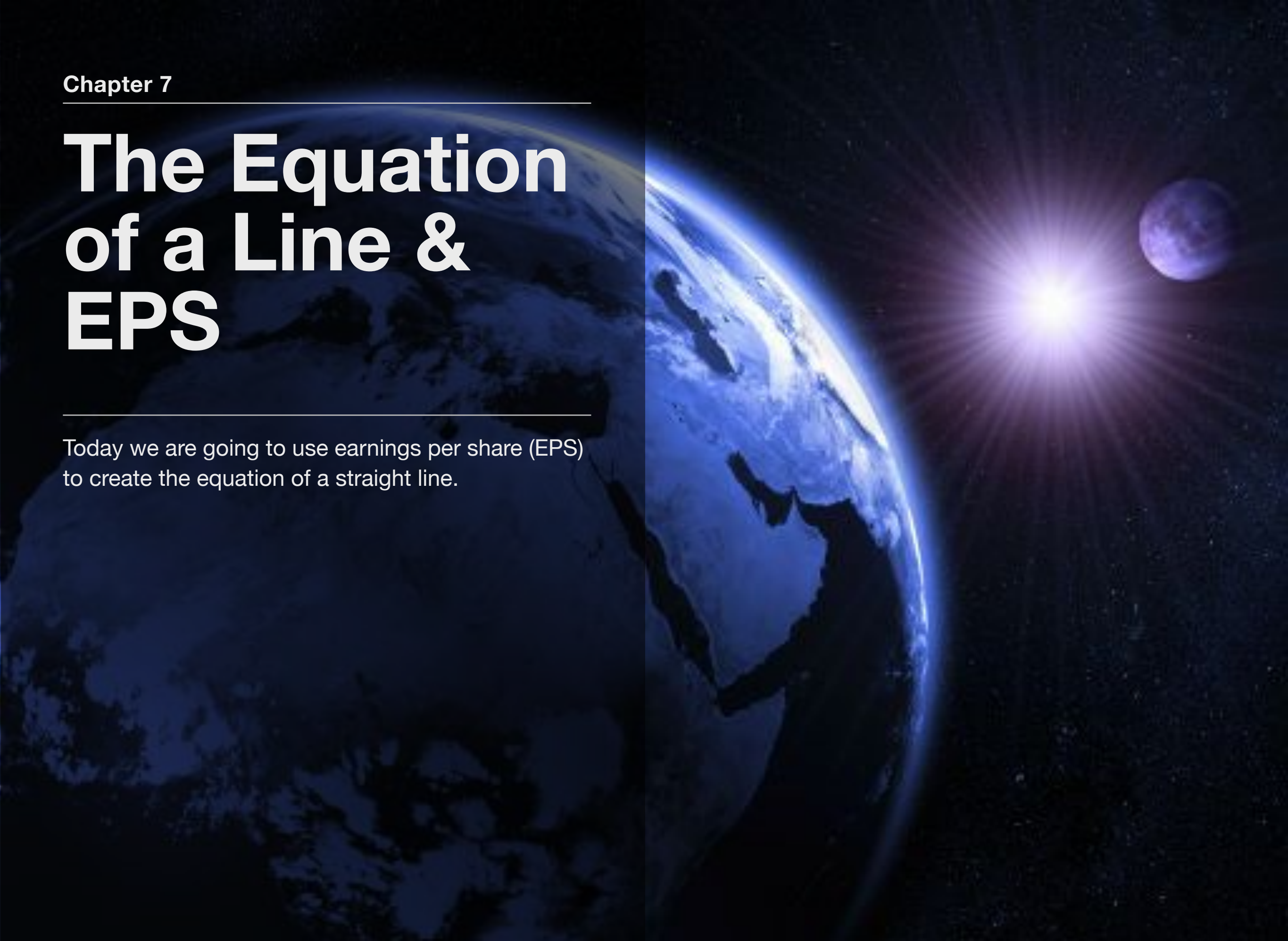
Calculating Common Difference & Common Ratio

	2007	2008	2009	2010	2011	Overall
NAV	\$12.89	\$13.07	\$16.51	\$17.96	\$19.73	
Common Difference		\$0.18	\$3.44	\$1.45	\$1.77	<u>\$1.71</u>
Common Ratio		1.4%	26.3%	8.8%	9.9%	<u>11.6%</u>

Table 4.1: Here I have calculated the common difference and common ratio for my book values. I just took the average this time.

The Equation of a Line & EPS

Today we are going to use earnings per share (EPS) to create the equation of a straight line.



Finding the Equation of a Line

The equation of a line is $y=mx+b$. We spent time in class today reviewing the equation of a line and I gave you worksheet 8A-I to take home and look at. In your iBook it would be good if you gathered the data for earnings per share for 2000 and 2001.

Homework

Homework for today is on Mathletics. It is due on Friday.

Asset

Something your company owns.

Related Glossary Terms

Book Value, Equity

Index

Book Value

How much the company is worth according to their accounting books. This is based on all the things the company owns (assets) minus all the things they owe (liabilities). Total book value (also known as equity) is for the whole company, but more often we care about the book value per share (NAV) because we buy shares of the company.

Related Glossary Terms

Asset, Equity, Liability, NAV

Index

CEO

Chief Executive Officer -- The boss of the company.

Related Glossary Terms

Drag related terms here

Index

Equity

The amount of money the shareholders of the company have as a group. As the company earns more money, the shareholders get more equity. If the company borrows money, the company gets money, but the shareholders don't get equity because the company has to pay the money back. Total equity is the value of the assets minus the value of the liabilities.

Ask Mom or Dad about the equity they have in their home.

Related Glossary Terms

Asset, Book Value, Liability

Index

Extrapolate

To extrapolate is to keep a pattern going into the future. It can be quite useful to extrapolate a trend to see what the future may look like, but you also have to use some common sense. If I extrapolated how much you grew in the first twenty years of your life, you might predict that you would be 6 meters tall by the time you were a grandparent.

Related Glossary Terms

Drag related terms here

Index

Liability

Money your company owes to someone else.

Related Glossary Terms

Book Value, Equity

Index

Lot

In Hong Kong, stocks are sold in round lots. Generally speaking, when you buy stock, you have to buy 1,000 shares of a given company at a time. Sometimes a round lot is 2,000 shares, and sometimes it's 500 or even 100 shares. (In the United States, round lots are 100 shares except for Berkshire Hathaway where they are 10 class A shares or 100 class B shares.) Buying in round lots makes it somewhat harder for young people to invest, since you need the share price (usually around \$1/share) times the lot size (usually 1,000 shares) plus the commission (around \$100) before you can buy stock. This means each time you buy a stock, you need about \$1,100 to purchase it. Luckily for students in Hong Kong, red pocket money each Chinese New Year tends to be on this order of magnitude. Set yourself a goal of buying one stock each Chinese New Year and by the time you graduate from college, you should have a diversified portfolio of half a dozen stocks or so.

Related Glossary Terms

Drag related terms here

Index

NAV

Net Asset Value -- This is the book value per share.

Related Glossary Terms

Book Value

Index